

What is claimed is:

### CLAIMS

1. An integrated telecommunications network element comprising:  
a plurality of add-drop-multiplexers, each multiplexer having one or more communications ports, each port carrying communications traffic that may include one or more port tributaries;  
a digital cross-connect configured to route communications traffic among the tributaries;  
and  
a controller configured to create one or more logical tributaries between the digital cross-connect and the ports by mapping one or more port tributaries into a logical tributary.
2. The network element of claim 1 wherein:  
the controller is configured to route working traffic from a port through a logical tributary to the digital cross-connect.
3. The network element of claim 2 wherein:  
the controller is responsive to one or more provisioning commands from a user by provisioning cross-connections between logical tributaries.
4. The network element of claim 2 wherein:  
the controller is responsive to a provisioning command from a user to provision working and protection paths from one port to another by determining the switching status of port tributaries.
5. The network element of claim 2 wherein:  
the controller is responsive to one or more commands received from a user by establishing a port protection group.
6. The network element of claim 5 wherein:

the controller is responsive to one or more provisioning commands from a user by determining whether a port associated with a particular port tributary is a member of a port protection group.

7. The network element of claim 6 wherein:  
the controller is responsive to one or more provisioning commands from a user by determining what type of port protection group the port is a member of.
8. The network element of claim 6 wherein:  
the controller is responsive to one or more provisioning commands from a user by determining the state of protection switching.
9. The network element of claim 2 wherein:  
the controller is responsive to one or more commands received from a user by establishing a path protection group.
10. The network element of claim 9 wherein:  
the controller is responsive to one or more provisioning commands from a user by determining whether a path associated with a particular port tributary is a member of a path protection group.
11. The network element of claim 10 wherein:  
the controller is responsive to one or more provisioning commands from a user by determining what type of path protection group the port is a member of.
12. The network element of claim 10 wherein:  
the controller is responsive to one or more provisioning commands from a user by determining the state of protection switching.

13. The network element of claim 2 wherein:  
the controller is responsive to commands from a user directed toward a logical tributary by identifying a port tributary corresponding to the logical tributary.
14. The network element of claim 2 wherein:  
the controller is responsive to commands from a user directed toward a logical tributary by determining which of a plurality of port tributaries is to be employed as a working tributary.
15. The network element of claim 2 wherein:  
the controller is responsive to commands from a user directed toward a logical tributary by determining which of a plurality of port tributaries is to be employed as a protection tributary.
16. The network element of claim 2 wherein:  
the controller is responsive to a port access identifier by retrieving network equipment information from the access identifier.
17. The network element of claim 2 wherein:  
the controller is responsive to a tributary access identifier by retrieving network equipment information from the access identifier.
18. The network element of claim 2 wherein:  
the controller is responsive to one or more user commands by establishing an atomic cross connection.
19. The network element of claim 2 wherein:  
the controller is responsive to one or more user commands by modifying a provisionable set of path protection groups.
20. The network element of claim 2 wherein:

The controller is responsive to one or more user commands by provisioning a cross-connection between logical tributaries.

21. In a multi-port telecommunications network element, a method for switching traffic :
  - A) receiving communications traffic at one communications port of a plurality of add-drop-multiplexers, each multiplexer having one or more communications ports, each port carrying communications traffic that may include one or more port tributaries;
  - B) routing the communications traffic from a port tributary through a digital cross-connect configured to route communications traffic among the tributaries;
  - C) a controller creating one or more logical tributaries between the digital cross-connect and the ports by mapping one or more port tributaries into at least one logical tributary; and
  - D) the controller provisioning traffic among port tributaries in response to commands to provision traffic among logical tributaries.
22. The method of claim 21 wherein:
  - E) the controller routes working traffic from a port through a logical tributary to the digital cross-connect.
23. The method of claim 22 wherein:
  - F) the controller determines the switching status of port tributaries in response to a provisioning command from a user to provision working and protection paths from one port to another.
24. The method of claim 22 wherein:
  - G) the controller establishes a port protection group in response to one or more commands received from a user.
25. The method of claim 24 wherein:
  - H) the controller determines whether a port associated with a particular port tributary is a member of a port protection group in response to one or more provisioning commands from a user.

26. The method of claim 25 wherein:
  - I) the controller determines what type of port protection group a port is a member of in response to one or more provisioning commands from a user.
27. The method of claim 25 wherein:
  - J) the controller determines the state of protection switching in response to one or more provisioning commands from a user.
28. The method of claim 22 wherein:
  - K) the controller establishes a path protection group in response to one or more commands received from a user.
29. The method of claim 28 wherein:
  - L) the controller determines whether a path associated with a particular port tributary is a member of a path protection group in response to one or more provisioning commands from a user.
30. The method of claim 29 wherein:
  - M) the controller determines what type of path protection group the port is a member of in response to one or more provisioning commands from a user.
31. The method of claim 29 wherein:
  - N) the controller determines the state of protection switching in response to one or more provisioning commands from a user.
32. The method of claim 22 wherein:
  - O) the controller identifies a port tributary corresponding to the logical tributary in response to commands from a user directed toward a logical tributary.

33. The method of claim 22 wherein:  
P) the controller determines which of a plurality of port tributaries is to be employed as a working tributary in response to commands from a user directed toward a logical tributary.
34. The method of claim 22 wherein:  
Q) the controller determines which of a plurality of port tributaries is to be employed as a protection tributary in response to commands from a user directed toward a logical tributary.
35. The method of claim 22 wherein:  
R) the controller retrieves network equipment information from a port access identifier.
36. The method of claim 22 wherein:  
S) the controller retrieves network equipment information from a tributary access identifier.
37. The method of claim 22 wherein:  
T) the controller by establishing an atomic cross connection in response to one or more user commands.
38. The method of claim 22 wherein:  
U) the controller modifies a provisionable set of path protection groups in response to one or more user commands.
39. The method of claim 22 wherein:  
W) the controller provisions a cross-connection between logical tributaries in response to one or more user commands.